Roethig, Hans-Juergen

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Sent: Monday, April 02, 2001 11:12 AM
To: Nelson, Bettie L; Kinser, Robin D.; McKinney, Willie J; Roethig, Hans-Juergen; Walk, Roger A.
Subject: Biomarker article

Language: EN English
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Title: **A multi-biomarker approach to study the effects of smoking on oxidative DNA damage and repair and antioxidative defense mechanisms**
Journal/Book Title: CARCINOGENESIS
Year: 2001
Abstract: We investigated the effects of smoking-induced oxidative stress in healthy volunteers (21 smokers versus 24 nonsmokers) by quantifying various markers of oxidative DNA damage and repair, and antioxidative defense mechanisms. Lymphocytic 7-hydroxy-8-oxo-2'-deoxyguanosine (8-oxo-dG) levels measured by high performance liquid chromatography with electrochemical detection, were significantly lower in smokers as compared with non-smokers (38.6 +/- 5.2 versus 50.9 +/- 4.6/10(6) dG, P = 0.05). The levels of oxidized pyrimidine bases in lymphocytes of smokers quantified by the endonuclease III-modified comet assay were non-significantly lower than those of nonsmokers (% DNA in tail: 13 +/- 3 versus 14 +/- 2; tail length: 69 +/- 13 versus 96 +/- 10; tail moment: 6416 +/- 1220 versus 7545 +/- 1234). Urinary excretion levels of 8-hydroxy-2'-deoxyguanosine (8-OH-dG) assessed by enzyme-linked immunosorbent assay did not differ significantly between smokers and non-smokers (197 +/- 31 versus 240 +/- 33 ng/body mass index, P = 0.3). Overall DNA repair activity expressed as unscheduled DNA synthesis in blood leukocytes, was not significantly different between smokers and non-smokers (2.9 +/- 0.3 versus 3.3 +/- 0.3, P = 0.4). Plasma antioxidative capacity measured by the Trolox equivalent antioxidant capacity assay was slightly higher in smokers as compared with non-smokers (440 a 16 versus 400 +/- 15 muM Trolox equivalent, P = 0.09), and it was significantly related to lymphocytic 8-oxo-dG levels (r = 0.4, P = 0.001). Genotyping of human 8-OH-dG glycosylase/apurinic lyase and glutathione S-transferase M1 showed that a polymorphism in either or both of the two genes does not affect any of the quantified biomarkers, We conclude that oxidative stress imposed by cigarette

PM3001395297

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smoking has a low impact upon certain pathways involved in DNA damage and the antioxidative defense system.

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Source: CARCINOGENESIS MAR 2001 v.v.22 is.is.3 pp. pp.395-401

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